PTN Electronics

DVI Matrix Switchers System

User Manual

Please read this manual carefully before using this product.

Notes：

This D**VI Matrix Switchers User Manual** takes example of the Matrix model MDV88A Pro. It can be used as user's manual of other MDV matrix switcher models.

This manual is only an instruction for operators, not for any maintenance usage. The functions described in this version are updated till Sep 2010. Any changes of functions and parameters since then will be informed separately. Please refer to the dealers for the latest details.

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All product function is valid till 2010-9-1

⚠ Safety Operation Guide

In order to guarantee the reliable operation of the equipments and safety of the staff , please abide by the following proceeding in installation, using and maintenance:

(1)

The system must be earthed properly. Please do not use two blades plugs and ensure the alternating power supply ranged from 100v to 240v and from 50Hz to 60Hz.

(2)

Do not put the switcher in a place where is too hot or too cold.

(3)

As the power generating heat when running, the working environment should be maintained fine ventilation, in case of damage caused by overheat.

(4)

Please cut off the general power switch in humid weather or left unused for long time.

(5)

Before following operation, ensure that the alternating current wire is pull out of the power supply :

A . Take off or reship any components of the equipment.
B . Take off or rejoin any pin or other link of the equipment.

(6)

As to non-professional or without permission, please DO NOT try to open the casing of the equipment, DO NOT repair it on your own, in case of accident or increasing the damage of the equipment.

(7)

DO NOT splash any chemistry substance or liquid in the equipment or around.

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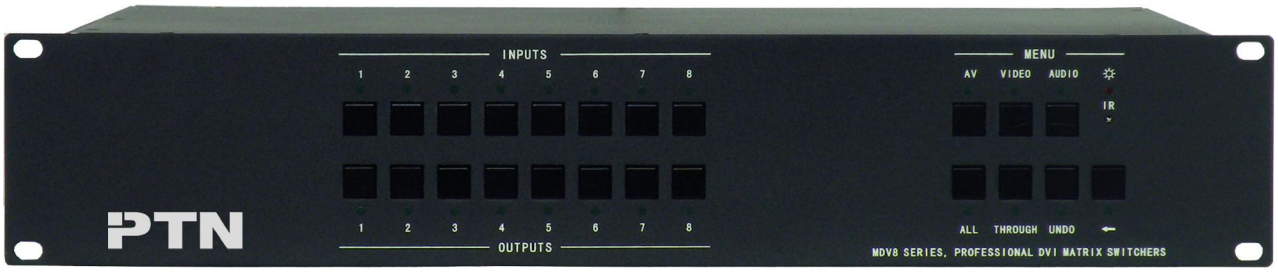
1. Introduction

1.1 About DVI Matrix Switcher System

MDV series Matrix switcher is a high-performance professional computer and audio signal switcher that can be used for cross switching of multi computer and audio signal. Independent DVI component and balance/unbalance I/O terminals make each component signal transmit and switch separately; this design can reduce attenuation of signal transmission to minimum and output the image and audio signal in high-fidelity quality.

DVI series switcher mostly apply in broadcasting TV engineering, multi-media meeting room, big screen display engineering, television education, command control center or other fields. A/V timing or separating switching function. It also has an adaptable compensation to extend the input distance to 36 meters. With RS232 interface, it can be worked with PC, remote control system and any other far-end control system devices. The user manual takes MDV88Apro as example, other models can take reference from it too.



1-1 DVI88A Pro switcher

1.2 DVI Matrix Switcher Models

According to different situation and users, the DVI series can be classified into the following models:

Specification / Model	Video Inputs	Video Outputs	Audio Inputs	Audio Outputs	RS232
MDV44APro	4	4	4	4	√
MDV88APro	8	8	8	8	√
MDV1616APro	16	16	16	16	√
MDV3232APro	32	32	32	32	√
MDV6464APro	64	64	64	64	√
MDV9696APro	96	96	96	96	√
MDV128128APro	128	128	128	128	√
MDV144144APro	144	144	144	144	√

Specification / Model	Video Inputs	Video Outputs	Audio Inputs	Audio Outputs	RS232
MDV44Pro	4	4	x	x	√
MDV88Pro	8	8	x	x	√
MDV1616Pro	16	16	x	x	√
MDV3232Pro	32	32	x	x	√
MDV6464Pro	64	64	x	x	√
MDV9696Pro	96	96	x	x	√
MDV128128Pro	128	128	x	x	√
MDV144144Pro	144	144	x	x	√

2. MDV Packing of the Product

DVI Matrix Switcher

IR remote

RS-232 Communication Cord

Power Supply Cord

CD

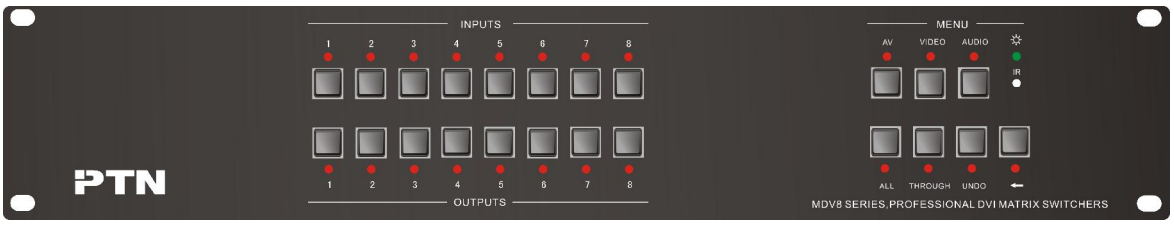
User Manual and Quality Guarantee

3. MDV Installation

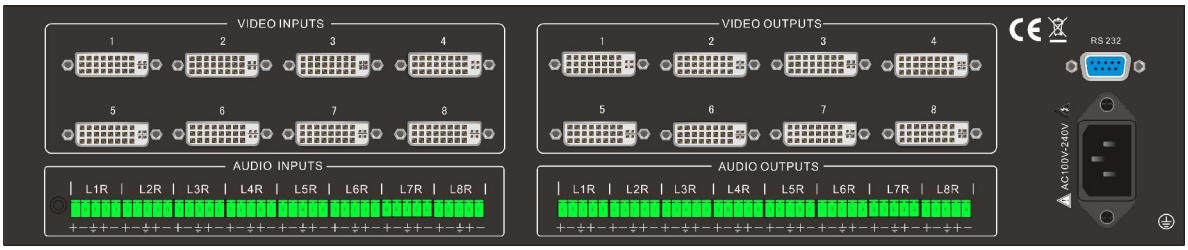
DVI matrix switchers adopt metal shell and can be stacked with other device. Moreover, they are rack-mountable enclosure and can be installed in the standard 19 inches case.

4. Front View and Rear View of the Product

4.1 Front view of MDV88A Pro



4.2 Rear view of MDV88A Pro



5. External Connection

5.1 Introduction of the Input and Output Connectors

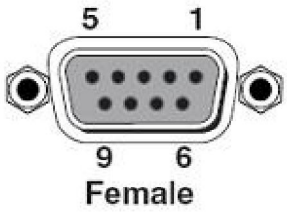
According to different type of matrix, computer signal I/O interface are made up of 8-channel BNC ports and DVI-D female ports respectively. audio signal I/O terminals are make up of 8-channel BNC ports and Captive screw connectors ports respectively. Please refer to shell silk-screen figure about other types of interface.

5.2 Connection of RS-232 Communication Port

Besides the front control panel, the DVI matrix switcher can be controlled by far-end control system or through the Ethernet control via the RS-232 communication port.

5.2.1 Connection with Control System

With the RS-232 port, the DVI matrix switchers can be controlled by several kinds of control systems.



This RS-232 communication port is a female 9-pin D connector. The definition of its pins is as the table below.

No.	Pin	Function
1	N/u	Unused
2	Tx	Transmit
3	Rx	Receive
4	N/u	Unused
5	Gnd	Ground
6	N/u	Unused
7	N/u	Unused
8	N/u	Unused
9	N/u	Unused

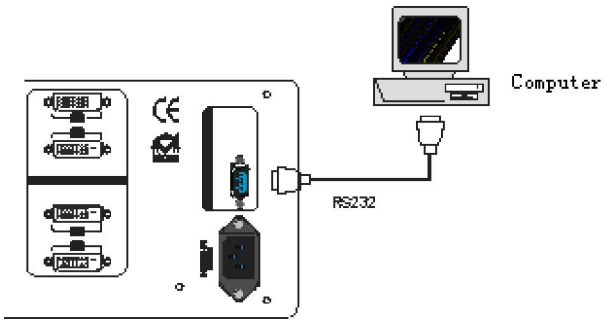
F 5-1 9HDF

5.2.2 Connection with Computer

When the switcher connects to the COM1 or COM2 of the computer with control software, users

can control it by that computer.

To control the switcher, users may use the public COM software. Please refer the details in Communication Protocol and Command Codes

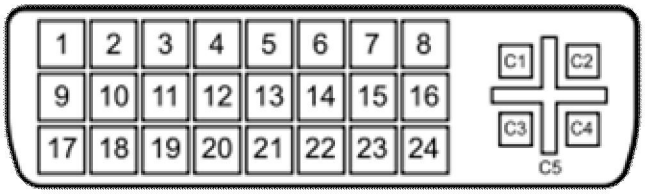


F 5-2 MDV connecting to computer

5.3 How to Connect with the Input and Output Terminals

The DVI matrix switchers may take DVD players, computers, graphic workstations and digital showing platform as their input signal source, and projectors, video recorders, displayers and amplifiers as their output signal destinations according to different situation.

DVI-I Dual Link:



F5—3 DVI-I Dual Link port

DVI-D pin function

PIN	function	PIN	function
1	T.M.D.S.Data2-	13	T.M.D.S.Data3+
2	T.M.D.S.Data2+	14	+5V Power
3	T.M.D.S. Data 2/4 Shield	15	Ground (for +5V)
4	T.M.D.S. Data 4-	16	Hot Plug Detect
5	T.M.D.S. Data 4+	17	T.M.D.S. Data 0—
6	DDC Clock	18	T.M.D.S. Data 0+
7	DDC Data	19	T.M.D.S. Data 0/5 Shield

8	No Connect	20	T.M.D.S.Data5－
9	T.M.D.S.Data1－	21	T.M.D.S.Data5＋
10	T.M.D.S.Data1+	22	T.M.D.S. Clock Shield
11	T.M.D.S.Data1/3 Shield	23	T.M.D. S. Clock +
12	T.M.D.S.Data3－	24	T.M.D.S .Clock－

Audio signal connection:

“AUDIO INPUT”, “AUDIO OUTPUTS” audio network interface in DVI matrix switchers (MDV) can be connected to the audio signal and amplify of the DVD player.

Audio connection is little complicated than video. It has two kinds of connection: balanced and unbalanced.

The balanced connection transmits a pair of balanced signals with two signal cords. Because interferences will have the same intensity and the opposite phases on the two signal cords, it will be counteracted in the end. For the low frequency extent of the audio signal, it would be easily interfered under long distance transmission. Therefore, as an anti-interference connection, it is mostly used in audio connection of special device.

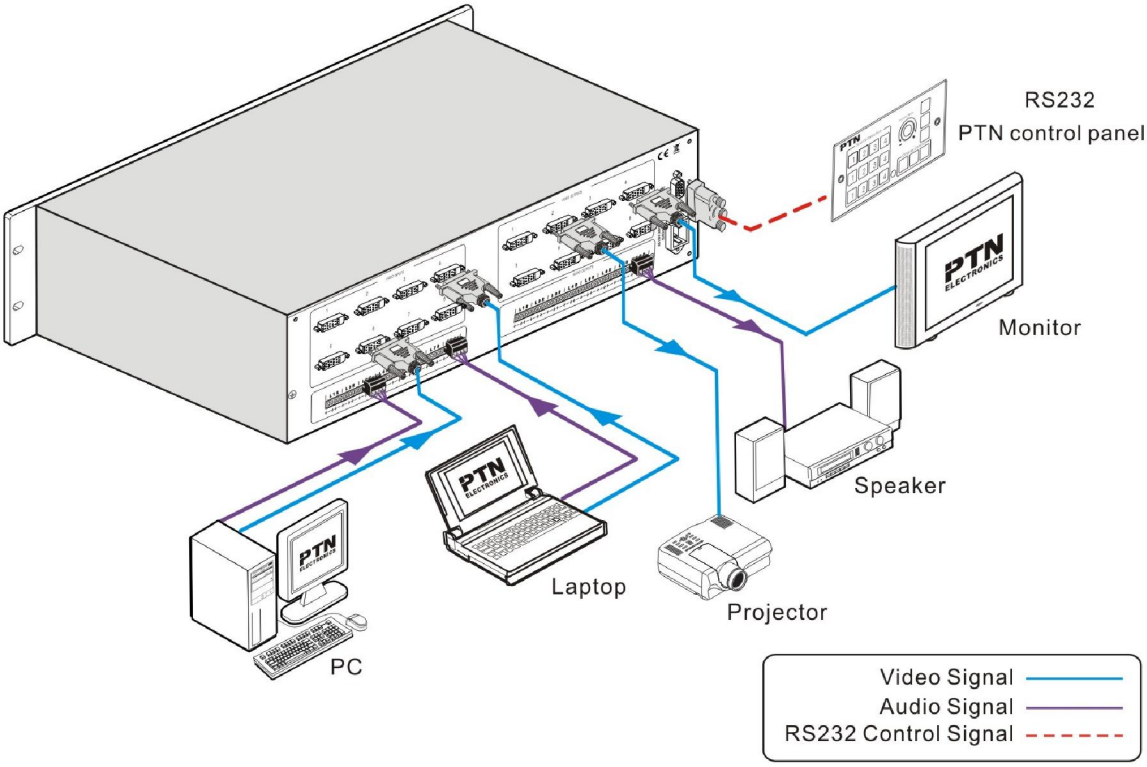
The unbalanced connection transmits signals only with a signal cord. Without counteraction, it can be interfered more easily. Accordingly, it is adopted for household appliance or some cases with low technical demand.

Take the audio signal line for example: 1.Unbalanced: pin “G” connect to SLEEVE, pin “+” connect to TIP, pin “–” connect to pin “G”; 2.Balanced: pin “G” connect to SLEEVE, pin “–” connect to RING, pin “+” connect to TIP. As shown in the F 5-3:

Unbalanced Input　Unbalanced Output　Balanced Input　Balanced Output

F5-3 5 bit 3.8mm Balanced/unbalanced connection on captive screw connector. To select which connection is up to the interface of the device. When available, the balanced connection is the first choice. Before connection, please read the command or relevant demand in the user manual carefully. In some cases, maybe there is balanced in source signal end but unbalanced in the destination end. If in a nonstandard case, it is done to connect balanced for the balanced end and unbalanced for unbalanced end. But if in a standard one, the converter must be used to switch the signals as the same, balanced or unbalanced.

System Diagram：



F5-4 DVI matrix system connection

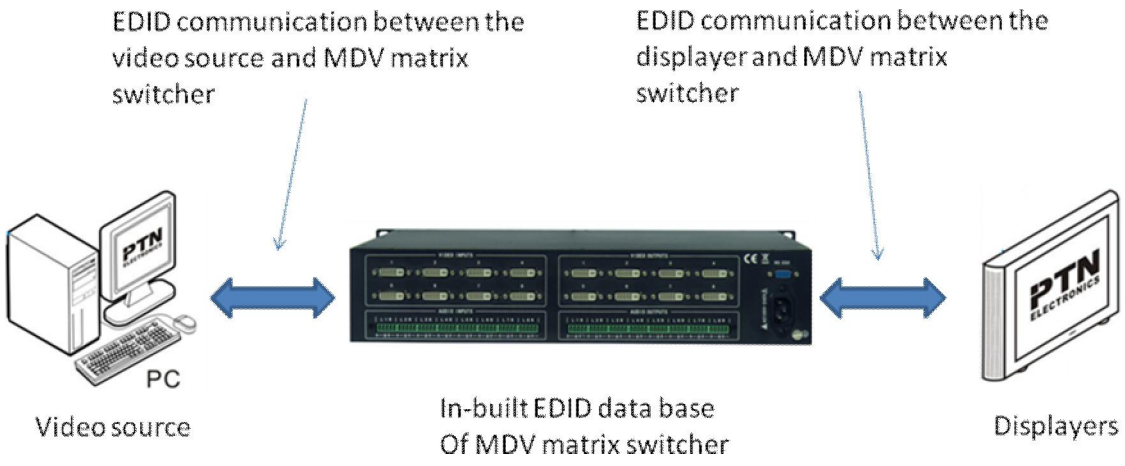
6. Operation of the EDID management

MDV matrix switcher is built in the EDID management database. The EDID management can be automatically shake hand, or manual exchanged, and factory restore.

6.1 EDID automatically shake hand

The MDV matrix switcher is built in the EDID data, which can communicate with the displayers and video source automatically. When the displayers or video sources are connected to the MDV matrix switcher, they will share the EDID/DDC information with the matrix switcher.

We take a MDV88A as example. The communication solution is like this:

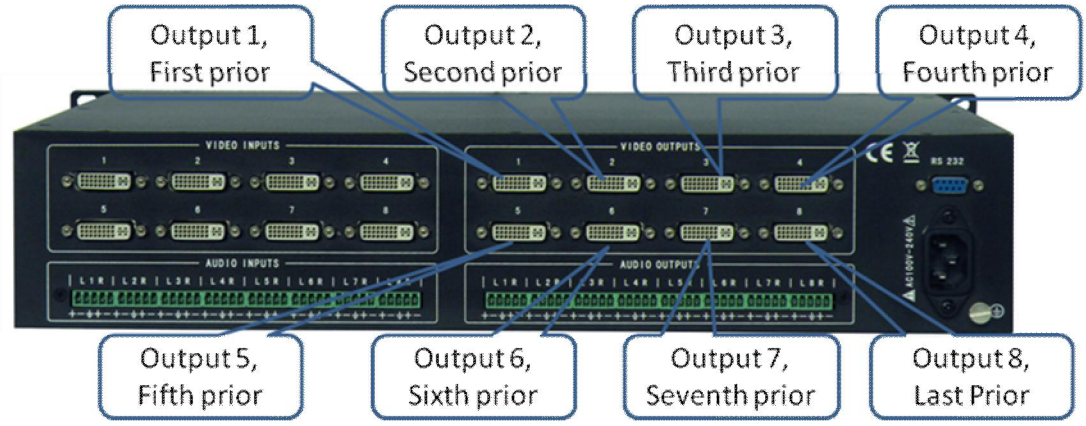

EDID communication between the video source and MDV matrix switcher
EDID communication between the displayer and MDV matrix switcher
PC
Video source
In-built EDID data base
Of MDV matrix switcher
Displayers

The MDV EDID database includes most popular displaying data, but not all the displaying data because of the capability and firmware limitation. So, we can manually refresh the EDID data to update the EDID data base.

EDID hand-shake priority

The EDID refresh ports have the priority grade, ranging from output 1 to output 8 in priority order. It means the output 1 is the most prior to exchange the EDID data, and then the output 2 is the second prior to exchange the EDID data. And, the output 8 is the least prior.

When the user carry the EDID erase/refresh function, the MDV will detect the output priority and exchange the EDID data with the available most prior output port.


Output 1, First prior
Output 2, Second prior
Output 3, Third prior
Output 4, Fourth prior
Output 5, Fifth prior
Output 6, Sixth prior
Output 7, Seventh prior
Output 8, Last Prior

6.2 EDID management by RS232 commands

When you need to refresh the EDID data of MDV matrix switcher, we can manually exchange the EDID data by sending the RS232 command “EDIDMOn.” (Please notice the text-transform, and the dot in behind.)

Erase and Refresh the EDID data

When the “EDIDMOn.” is sent, the MDV matrix switcher will copy the EDID data from the most prior output port. It means the MDV will erase the old EDID data, and fully copy the EDID data from the displayer which is connected to the most prior output port.

EDID restore to factory default

When we send the “EDIDMInit.” to the MDV matrix switcher, it will recover the factory default EDID data.

RS232 feedback:

When the “EDIDMOn.” or “EDIDMInit.” is correctly sent, all the connected displayers will be blank for 2~3 seconds and recover again. And, the MDV matrix switcher will send out a RS232 feedback command “EDIDMOn.” or “EDIDMInit.”.

If all these symbols works, it means the action is taken

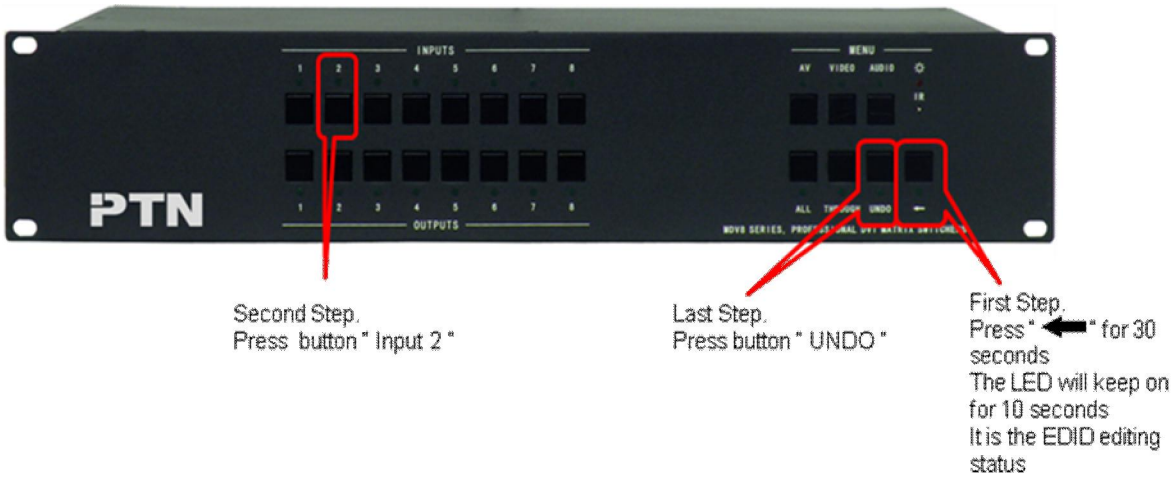
6.3 EDID management by buttons

When you need to recover the ex-factory default EDID data set, we can send the RS232 command or press the buttons of the front panel/IR remote to make it work.

Erase and Refresh the EDID data

Keep pressing the button “<-” for 30 secnds , all the LED of “<-” will be on for 10 seconds. It enters the EDID setting status.

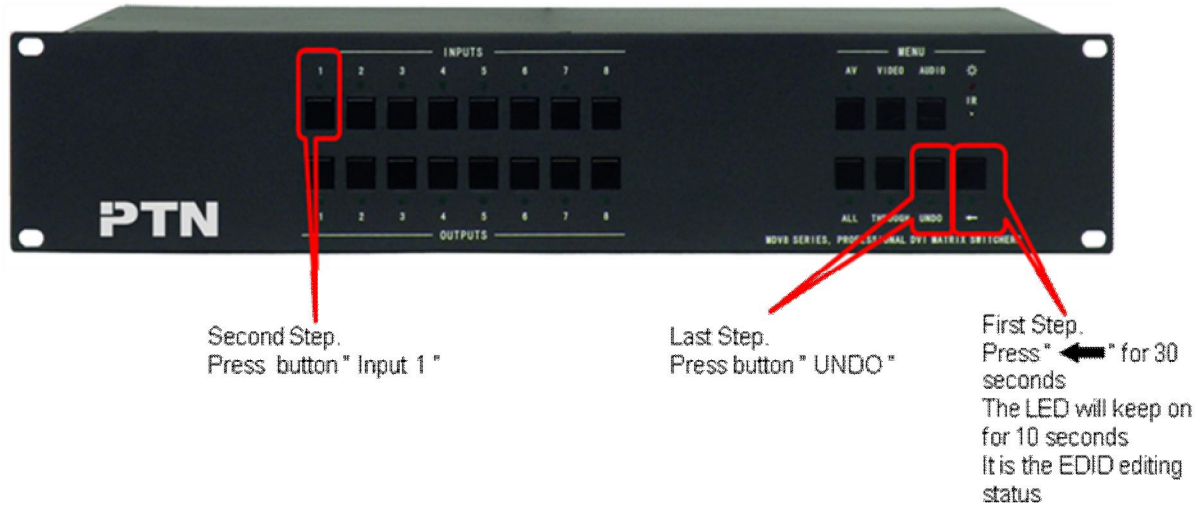
And, pressing “Input 2” button and “Undo” button. All the outputs will be blank for 3 seconds, to carry the “EDIDMOn.” command, to refresh the EDID.



EDID restore to factory default

Keep pressing the button “<-” for 30 secnds , all the LED of “<-” will be on for 10 seconds. It enters the EDID setting status.

And, pressing “Input 1” button and “Undo” button. All the outputs will be blank for 3 seconds, to carry the “EDIDInit.” command, to restore the EDID to factory default.


Second Step.
Press button " Input 1 "
Last Step.
Press button " UNDO "
First Step.
Press " ← " for 30 seconds
The LED will keep on for 10 seconds
It is the EDID editing status

7. Operation of the Control Panel

7.1 Front Panel Description

“AV” AV synchronal button: To transfer video and audio signal synchronously by the switcher
Example: To transfer both the video and the audio signals from input channel No.3 to output channel No.4.
Operation: Press buttons in this order “AV”,“3”,, “4””.

“VIDEO” Video button: To transfer only video signals from input channel to output channel
Example: To transfer video signals from input channel No.3 to output channel No.4.
Operation: Press buttons in this order “VIDEO”, “3”, “4”.

“AUDIO” Audio button: To transfer only audio signals from input channel to output channel
Example: To transfer audio signals from input channel No.2 to output channel No.3.
Operation: Press buttons in this order ““AUDIO”, “2”, “3””.

“1,2,3,4” I/O Keypads: Keys to select I/O channels.
Example: To transfer input channel No.3 to output channel No.1
Operation: Press buttons in this order : “3” in INPUT area, “1” in OUTPUT area.

“All ” The button to transfer one input channel to all output channels
Example :To transfer input1 to all outputs.
Operation: Press buttons in this order : “1”, “All”.

"Though"	The button to transfer input to the corresponding output. Example :To transfer input 2 to output 2 Operation :Press the button in this order : "2", "Though"
" ← "	Backspace button: To backspace the latest input button Example: To cancel input 3 Operation: Press button in this order : "3", " ← "
"UNDO"	Undo button: To resume to the status before the command just performed Example: To cancel you latest switching status :input 3 through output 5 Operation: Press the button in this order: "3" input area, "5" output area, "UNDO"

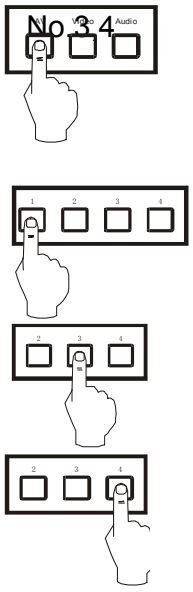
7.2 Command Format of the Switching Operation

With the front control panel, the switcher could be control directly and rapidly by pressing the buttons under below format.
"Menu" +"Input Channel" +"Output Channel 1"

"Menu": "AV", "Audio", "Video"
"Input Channel": Fill with the number of input channel to be controlled
"Output Channel": Fill with the number of output channels to be controlled

7.3 Examples of Operation

Example 1 : To transfer video and audio signals from input channel No.1 to output channel No.3 4



1, Press the button for switching mode "AV" for the switching mode of video and audio ("Audio" for the switching mode of audio only; "Video" for the switching mode of video only)

2, Press the button for input channel number"1"

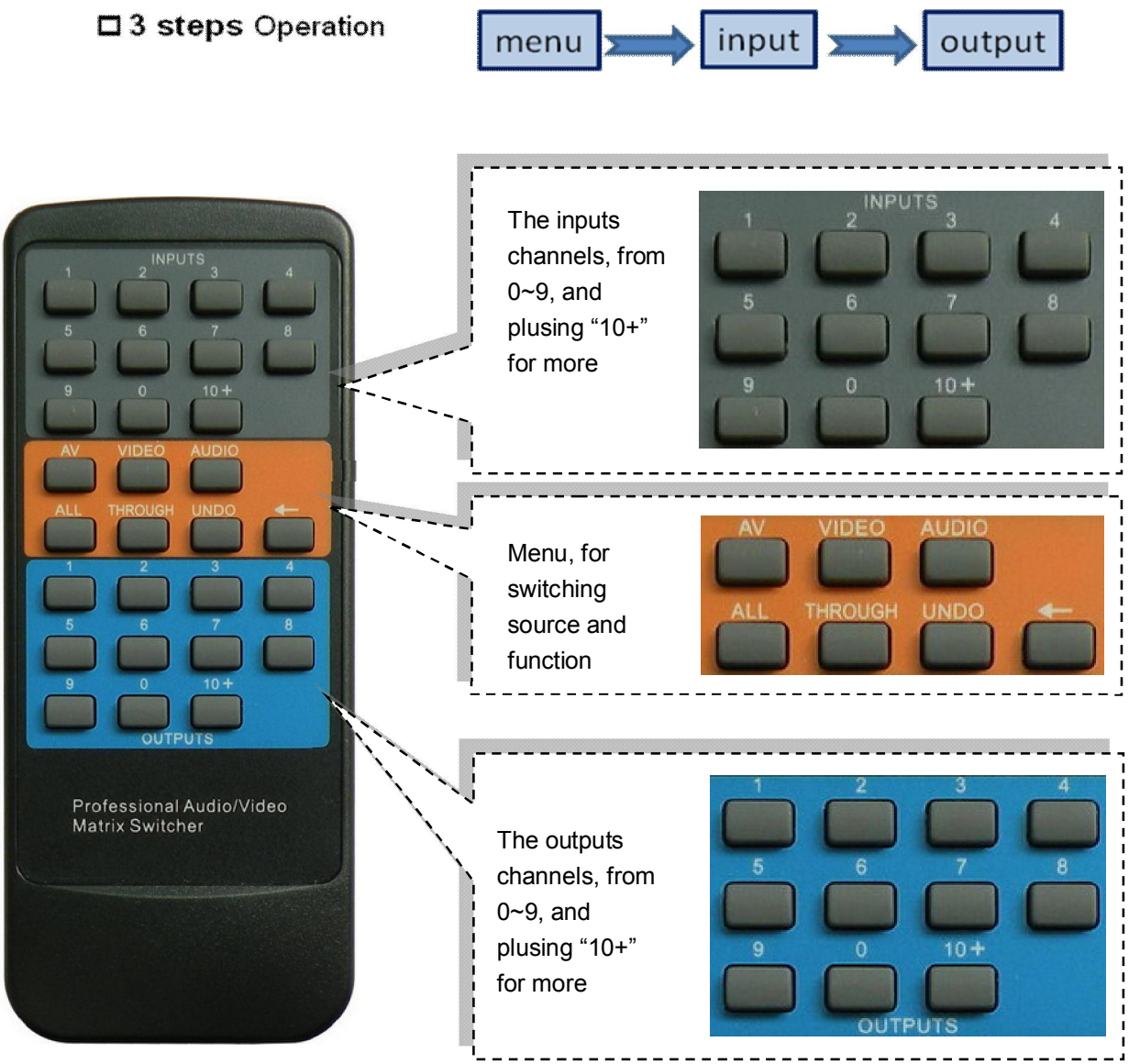
3,Press the button for the first output channel number "3"

4, Press the button for the second output channel number "4"

Then, switching OK ! audio/video switching from "1" to "3" and "4"

8. Usage of the Remote Controller

With the infrared remote controller, the matrix switcher could be control remotely. Because the function buttons on the remote controller are the same with the ones on the front control panel, the remote controller shares the same control operation and command format with the control panel.



9. Communication Protocol and Command Codes

With this command system, the RS232 software is able to control and operate the DVI Matrix with remotely.

Communication protocol:

Baud rate: 9600 Data bit: 8 Stop bit: 1 Parity bit: none

Command Types	Command Codes	Functions
System Command	/*Type;	Inquire the models information.
	/%Lock;	Lock the keyboard of the control panel on the Matrix.
	/%Unlock;	Unlock the keyboard of the control panel on the Matrix.
	/^Version;	Inquire the version of firmware
	/:MessageOff;	Turn off the feedback command from the com port. It will only show the “switcher OK”.
	/:MessageOn;	Turn on the feedback command from the com port.
	EDIDMOn.	Manually adjust the EDID with the most priority output port.
	EDIDMInit.	Recover the factory default EDID data
	Undo.	To cancel the previous operation.
	Demo.	Switch to the “demo” mode, 1->1, 2->2, 3->3 … and so on.
	[x1]All.	Transfer signals from the input channel [x1] to all output channels
	All#.	Transfer all input signals to the corresponding output channels respectively.
	All$.	Switch off all the output channels.
	[x1]#.	Transfer signals from the input channel [x1] to the output channel [x1].
	[x1]$.	Switch off the output channel [x1].
Operation Command (PTN2.0 Command System)	[x1] V[x2].	Transfer the video signals from the input channel [x1] to the output channel [x2].
	[x1] V[x2],[x3],[x4].	Transfer the video signals from the input channel [x1] to the output channels [x2], [x3] and [x4].
	[x1] A[x2].	Transfer the audio signals from the input channel [x1] to the output channel [x2].
	[x1] A[x2],[x3],[x4].	Transfer the audio signals from the input channel [x1] to the output channels [x2], [x3] and [x4].
	[x1] B[x2].	Transfer both the video and the audio signals from the input channel [x1] to the output channel [x2].
	[x1] B[x2],[x3],[x4].	Transfer both the video and the audio signals from the input channel [x1] to the output channels [x2], [x3] and [x4].
	Status[x1].	Inquire the input channel to the output channel [x1].
	Status.	Inquire the input channel to the output channels one by one.
	Save[Y].	Save the present operation to the preset command [Y]. [Y] ranges from 0 to 9.

	Recall[Y].	Recall the preset command [Y].
	Clear[Y].	Clear the preset command [Y].

Note:

1. [x1], [x2], [x3] and [x4] are the symbols of input or output channels ranged according to the model of the matrix switcher. If the symbols exceed the effective range, it would be taken as a wrong command.
2. In above commands, "["and "]" are symbols for easy reading and do not need to be typed in actual operation.
3. Please remember to end the commands with the ending symbols "." and ";".

Detail Examples:

1、 Transfer signals from an input channel to all output channels: [x1]All.
Example: To transfer signals from the input channel No.3 to all output channels. Run Command: "3All."

2、 Transfer all input signals to the corresponding output channels respectively: All#.
Example: If this command is carried out on an MVG1616-A matrix switcher, the status of it will be: 1->1, 2->2, 3->3, 4->4……16->16.

3、 Switch off all the output channels: All$.
Example: After running this command, there will be no signals on all the output channels.

4、 Check the version of the firmware: /^Version;
To check the version of the firmware.

5、 Switch off the detail feedback command from the COM port: /:MessageOff;
Switch off the detail feedback information from the COM port. But, it will leave the "switch OK" as the feedback, when you switch the matrix.

6、 Switch on the detail feedback command from the COM port: /:MessageOn;
Switch on the detail feedback information from the COM port. it will show the detail switch information when it switch. Example: when switch 1->2 for Audio, it will feedback "A0102".

7、 Transfer signals from an input channel to the corresponding output channel: [x]#.
Example: To transfer signals from the input channel No.5 to the output channel No.5. Run Command: "5#."

8、Switch off an output channel: [x]$.

Example: To switch off the output channel No.5. Run Command: "5$."

9、Switch video signals command: [x1] V[x2].

Example: To transfer the video signals from the input channel No.3 to the output channel No.5. Run Command: "3V5."

10、Switch audio signals command: [x1] A[x2].

Example: To Transfer the audio signals from the input channel No.10 to the output channel Run Command: "10A2."

11、Switch both video and audio signals synchronously: [x1] B[x2].

Example: To transfer both the video and the audio signals from the input channel No.120 to the output channel No.12,13,15. Run Command: “120B12,13,15.”

12、Inquire the input channel to the output channel [x]: Status[x].

Example: To inquire the input channel to the output channel No.23. Run Command: “Status23.”

13、Inquire the input channel to the output channels one by one: Status.

Example: To inquire the input channel to the output channels one by one. Run Command: “Status.”

14、Save the present operation to the preset command [Y]: Save[Y].

Example: To save the present operation to the preset command No.7. Run Command: “Save7.”

15、Recall the preset command [Y]: Recall[Y].

Example: To recall the preset command No.5. Run Command: “Recall5.”

16、Clear the preset command [Y]: Clear[Y].

Example: To clear the preset command No.5. Run Command: “Clear5.”

10. Specification

Video Input		Video Output	
Input	8 DVI	Output	8 DVI
Input Connector	Female DB24+5	Output Connector	Female DB24+5
Input Level	T.M.D.S. 2.9V/3.3V	Output Level	T.M.D.S. 2.9V/3.3V
Input Impedence	75Ω	Output Impedence	75Ω
Video General			
Gain	0 dB	Bandwidth	340 MHz (10.2 Gbit/s)
Video Signal	DVI 1.0 standard DVI-D full digital T.M.D.S signal	Max Time-delay	5nS (±1nS)
Switching Speed	200ns (Max.)	Crosstalk	<-50dB@5MHz
EDID and DDC Management	Supports Extended Display Identification Data (EDID) and Display Data Channel (DDC) data using DVI and HDMI standards, EDID and DDC signals are actively bufferred.The built-in EDID/DDC database can analyze these two signals, mix them, and realize the handshake of them internally.		
HDCP Management	Compliant with High-bandwidth Digital Content Protection (HDCP) using DVI and HDMI 1.3 standards. The built-in HDCP management technology can analyze HDCP key, and realize the handshake internally.		
Audio Input		**Audio Output**	
Input	8 stereo, balanced/unbalanced	Output	8 stereo, balanced/unbalanced
Input Connector	Captive screw connectors, 5 pole	Output Connector	Captive screw connectors, 5 pole
Input Impedance	>10KΩ	Output Impedance	50Ω
Audio General			
Frequency Response	20Hz ~ 20KHz	CMRR	>90dB@20Hz~20KHz
Stereo Channel Separation	>80dB@1KHz	THD + Noise	1%@1KHz, 0.3%@20KHz at nominal level
Control Parts			
Serial Control Port	RS-232, 9-pin female D connector	Pin Configurations	2 = TX, 3 = RX, 5 = GND
IR Remote	Default IR remote	Front Panel Control	Buttons
Options	TCP/IP control by PTNET(PTN's programmable interface)		
General			
Power Supply	100VAC ~ 240VAC, 50/60Hz	Power Consumption	25W
Temperature	-20 ~ +70℃	Humidity	10% ~ 90%
Case Dimension	W483 x H87 x D320mm (2U high, full rack wide)	Product Weight	2.5Kg

11.Troubleshooting & Maintenance

1) When the output image in the destination device connected to the DVI Matrix (MDV) has ghost, such as the projector output with ghost, please check the projector's setting or try another high quality connection cord.

2) When there is a color losing or no video signal output,， Maybe the DVI cables haven't been connected as DVI1.0 criterion

3) When the remote controller doesn't works:
   A. Maybe the battery is run out of, please change a new one.
   B. Maybe the controller is broken, please ask the dealer to fix it.

4) When user can not control the DVI Matrix (MDV) by computer through its COM port, please check the COM port number in the software and make sure the COM port is in good condition.

5) If there is not "beep" sound when switching the I/O signal, please make sure the beeper is switched-on. If so, the beeper inside the matrix may be broken. Please send it to the dealer for fixing.

6) When switching , the beeper beeps but without any output image：
   A. Check with oscilloscope or multimeter if there is any signal at the input end. If there is no signal input, it may be the input connection cord broken or the connectors loosen.
   B. Check with oscilloscope or multimeter if there is any signal at the output end. If there is no signal output, it may be the output connection cord broken or the connectors loosen.
   C. Please make sure the destination device is exactly on the controlled output channel
   D. If it is still the same after the above checking, it may be something wrong in the switcher. Please send it to the dealer for fixing.

7) If the output image is interfered, please make sure the system is earthed well.

8) If the static becomes stronger when connecting the DVI connectors, it may be due to the incorrect earthling of the power supply, Please earth it again correctly, and otherwise it would bring damage to the switcher or shorten its natural life.

9) If the Matrix can not be controlled by the keys on the front panel, RS232 port or remote controller, the host may has already been broken. Please send it to the dealer for fixing.